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Date: May 28, 2008 Name: Rusi P. Taleyarkhan, Ph.D. Signature: Rusi P. Taleyarkhan

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
AMENDED APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTOR(S):	Rusi P. Taleyarkhan
EXAMINER(s):	R. Palabrica
TITLE:	METHODS & APPARATUS TO INDUCE D-D AND D-T REACTIONS
Serial Number:	10,692,755
Group Art	3663
Filed:	10/27/2003
Response to:	05/01/2008 Office Communication
ATTORNEY(S)/ ADDRESS:	Pro Se basis. 612 Shady Creek Drive Lafayette, IN 47905 (765)-447-8851

RESPONSE TO 05/01/2008 NON-FINAL OFFICE ACTION

Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Dear Sir:

This is in response to guidance from the Office Action mailed 05/01/2008 and pursuant to interview with USPTO examiner R. Palabrica.

Applicant presents (beginning on next page of this package) as requested a complete listing of all claims (including amendments), and includes text of all pending claims (including withdrawn claims). A remarks section follows.

Applicant attests: "This amendment includes no new matter."

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CLAIMS

What is claimed is:

1.(Withdrawn). A nuclear fusion reactor, comprising:

a) a reactor chamber for holding a working liquid molecules, said working liquid molecules including at least two nuclei of heavy isotopes of hydrogen;

b) structure for placing at least a portion of said liquid into a tension state, said tension state being below a cavitation threshold of said liquid, said tension state imparting stored energy into said liquid portion;

c) a nuclear cavitation initiation source for nucleation of at least one bubble from said tension liquid, said bubble having as an nucleated bubble radius being greater than a critical bubble radius of said liquid;

d) a pressure field source of growing said as nucleated bubble to form at least one expanded bubble; and

e) a pressure field for imploding said expanded bubble, wherein following implosion of said expanded bubble a resulting temperature sufficient to induce at least one nuclear fusion reaction is provided to said liquid.

2(Withdrawn) The reactor of claim 1, wherein said structure for placing said liquid under tension comprises and acoustical wave source.

3 (Withdrawn) The reactor of claim 1, wherein said structure for placing said liquid under tension comprises an acoustical wave source.

4(Withdrawn) The reactor of claim 2, wherein said acoustical wave source includes an acoustical wave focusing device.

5(Withdrawn) The reactor of claim 1, wherein said structure for placing said liquid under tension comprises at least one centrifugal source.

6(Withdrawn) The reactor of claim 1, wherein said structure for placing said liquid under tension comprises at least one magnetrostrictive source.

7(Withdrawn) The reactor of claim 1, wherein said structure for placing said liquid under tension comprises at least one piezoelectric source.

8(Withdrawn) The reactor of claim 1, wherein said nucleated bubble radius is less than 100 nm.

9 (Withdrawn) The reactor of claim 1, wherein a ratio of a maximum radius of said expanded bubbles divided by said nucleated bubble radius is at least 10^5.

10 (Withdrawn) The reactor of claim 1, wherein said nuclear source comprises at least one selected from the group consisting of alpha emitters, neutron sources and fission fragments.

11(Withdrawn) The reactor of claim 1, wherein said nuclear source comprises a neutron source.

12 (Withdrawn). The reactor of claim 11, wherein said neutron source is an isotopic source having at least one shutter, said shutter opened to synchronize neutron impact with location in said liquid when said liquid is at a predetermined liquid tension level.

13 (Withdrawn) The reactor of claim 1, wherein said nuclear source comprises an alpha particle source.

14 (Withdrawn) The reactor of claim 13, wherein said alpha particle source is dissolved in said liquid.

15 (Withdrawn) The reactor of claim 1, wherein said liquid comprises deuterated acetone.

16(Withdrawn) The reactor of claim 1, wherein said reactor further includes a controller for synchronizing delivery of at least one cavitation signal from said cavitation initiation source at a predetermined location in said liquid.

17(Withdrawn) The reactor of claim 1, further comprising a structure for cooling said liquid to a temperature below an ambient temperature.

18 (Withdrawn) The reactor of claim 1, wherein said fusion reaction generates at least one of tritium and neutrons.

19 (Withdrawn) The reactor of claim 1, further comprising at least one external constraint for restraining said liquid.

20 (Withdrawn) A nuclear fusion-based electrical power plant, comprising:

a) a reactor chamber for holding a working liquid; said working liquid molecules including at least two nuclei of heavy isotopes of hydrogen;

b) structure for placing at least a portion of said working liquid into a tension state, said tension state being below a cavitation threshold of said liquid, said tension state imparting stored energy into said liquid portion;

c) a nuclear cavitation initiation source for nucleation of at least one bubble from said tension liquid, said bubble having an as nucleated bubble radius being greater than a critical bubble radius of said liquid;

d) a pressure field source for growing said as nucleated bubble to form at least one expanded bubble;

e) a pressure field for imploding said expanded bubble, wherein following implosion of said bubble a resulting temperature sufficient to induce at least one nuclear fusion reaction is provided to said liquid, and

f) structure for converting energy released from said fusion reaction to electrical energy.

21. (Withdrawn) A nuclear fusion-based projectile launcher, comprising:

a) a reactor chamber for holding a working liquid molecules, said working liquid molecules including at least two nuclei of heavy isotopes of hydrogen;

b) structure for placing at least a portion of said working liquid into a tension state, said tension state being below a cavitation threshold of said liquid, said tension state imparting stored energy into said liquid portion;

c) a nuclear cavitation initiation source for nucleation of at least one bubble from said tensioned liquid, said bubbles having an as nucleated bubble radius being greater than a critical bubble radius of said liquid; said bubbles a resulting temperature sufficient to induce at least one nuclear fusion reaction is provided to said liquid, and

d) a movable constraint bounding said reaction chamber for transferring energy from said fusion reaction to propel a projectile.

e) a pressure field for imploding said expanded bubble, wherein following implosion of said bubble a resulting temperature sufficient to induce at least one nuclear fusion reaction is provided to said liquid, and

f) a movable constraint bounding said reaction chamber for transferring energy from said fusion reaction to propel a projectile.

22. (Cancelled) A method for producing nuclear fusion, comprising the steps of: a) placing working liquid molecules into a tension state, said working liquid molecules including at least two nuclei of heavy isotopes of hydrogen, said tension state being below the cavitation threshold of said working liquid, said tension state imparting stored energy into said working liquid; b) cavitating at least a portion of said tensioned liquid with nuclear particles sufficient to bubble nucleate at least one bubble, said bubble having an as nucleated bubble radius greater than a critical bubble radius of said liquid; c) growing said as nucleated bubble to form at least one expanded bubble using a pressure field; and d) imploding said expanded bubble,

wherein a resulting temperature from said implosion is sufficient to induce a nuclear fusion reaction involving said liquid.

23. (Cancelled). The method of claim 22, wherein said fusion reaction is a D-D reaction or a D-T reaction.

24. (Cancelled). The method of claim 22, further comprising the step of degassing said liquid.

25. (Cancelled). The method of claim 22, further comprising the step of cooling said liquid to a temperature below an ambient temperature.

26. (Withdrawn) The method of claim 22, wherein a centrifugal source is used for said tensioning.

27 (Cancelled). The method of claim 22, wherein an acoustical wave source is used for said tensioning.

28 (Cancelled). The method of claim 27, further comprising the step of focusing acoustical waves provided by said acoustical wave source.

29 (Cancelled). The method of claim 22, wherein said as nucleated bubble radius is less than 100 nm.

30 (Cancelled). The method of claim 22, wherein a ratio of a maximum radius of said expanded bubbles divided by said as nucleated bubble radius is at least 10^5.

31 (Cancelled). The method of claim 22, wherein a neutron source is used for generating neutrons, further comprising the step of synchronizing neutron impact with a location in said working liquid having a predetermined liquid tension level.

32 (Cancelled). The method of claim 22, further comprising the step of synchronizing delivery of at least one cavitation initiation signal with a desired tension level in said liquid.

33 (Cancelled). The method of claim 23, wherein said liquid comprises deuterated acetone.

34. (Currently Amended). A ~~thermonuclear~~ method for producing thermonuclear nuclear fusion, comprising the steps of:

providing a working liquid enriched with isotopic D or T atoms comprising molecules;

~~degassing said liquid to reduce a dissolved gas content therein, wherein said dissolved gas is removed using an applied vacuum~~;

placing at least a portion of said liquid into a tension state, a maximum tension in said tension state being below the cavitation threshold of said liquid, said tension state imparting stored mechanical energy into said liquid portion;

directing ~~fundamental particles~~ nucleating agents comprising at least one of: neutrons, photons, alpha particles and fission products, at said liquid portion when said liquid portion is in said tension state, said ~~fundamental particles~~ nucleating agents having sufficient energy for nucleating a plurality of bubbles substantially filled with vapor from said liquid, said bubbles substantially filled with vapor having an as nucleated bubble radius greater than a critical bubble radius of said liquid;

growing said bubbles; and

imploding said bubbles substantially filled with vapor, wherein a resulting temperature obtained from energy released from said implosion is sufficient to

induce a nuclear fusion reaction of said isotopic D or T atom comprising molecules in said liquid portion.

35. (Currently amended). The method of claim 34, wherein said thermonuclear fusion reaction is a D-D reaction or a D-T reaction.

36. (Previously presented). The method of claim 34, further comprising the step of cooling said liquid to at temperature below an ambient temperature.

37. (Previously presented). The method of claim 34, wherein said tension state is a part of a time-varying pressure state including compressive and tensile portions.

38. (Previously presented). The method of claim 34, wherein said tension state is a constant tension state.

39. (Previously presented). The method of claim 34, wherein an acoustical wave source is used for said tensioning.

40. (Previously presented). The method of claim 39, further comprising the step of focusing acoustical waves provided by said acoustical wave source.

41. (Previously presented). The method of claim 34, wherein said as nucleated bubble radius is from 10 to 100 nm.

42. (Previously presented). The method of claim 34, wherein a neutron source is used for said nucleating, further comprising the step of synchronizing neutron impact with a location in said liquid having a predetermined liquid tension level.

43. (Previously presented). The method of claim 34, wherein said liquid is an organic liquid.

44. (Previously presented). The method of claim 34, wherein said fundamental particles are selected from the group consisting of alpha particles, neutrons and fission fragments.

45. (Previously presented). The method of claim 34, wherein said growing and imploding occurs responsive to an applied acoustical field.

46. (New). The method of claim 34, wherein said liquid is a high accommodation coefficient liquid.

47. (New) An apparatus for producing thermonuclear fusion, comprising:

a chamber containing a high accommodation coefficient liquid;

a means for inducing tension in said high accommodation coefficient liquid;

a nucleating agent comprising at least one of: neutrons, alpha particles, photons and fission products;

a means for enhancing the size of the nucleated bubbles in tension to a volume greater than a predetermined volume before inducing controlled implosion; thereby producing thermonuclear fusion.

REMARKS

The Applicant has personally met with Examiner (Dr. Palabrica) and engaged in a detailed one-on-one discussion in good faith to strive to ameliorate questions cited by Examiner in previous Office Actions. Applicant explained concepts of acoustic thermonuclear fusion, demonstrated operability of invention apparatus in specification, discussed differences with prior art, discussed the aspect of removal of non-condensible gases from nucleated bubbles (to obtain substantially vapor-filled bubbles), discussed the various independent confirmation studies conducted and reported in the literature since 2003 and discussed the theoretical foundations associated with the claim of thermonuclear fusion induction during implosion of substantially deuterated vapor filled bubbles following the methods outlined in this application.

Evidence and demonstration for thermonuclear (fusion) nature of the present application

In addition, the applicant discussed with Examiner Dr. Palabrica the published findings (Fig. 7c) in the premier journal *Physical Review E*, Vol. 69, 036109-1 to 11, by Taleyarkhan et al., 2004 which demonstrates experimentally that D-D fusion neutrons of 2.45 MeV in energy as required for thermonuclear fusion are emitted in a time –correlated manner with the emission of sonoluminescence (SL) light flashes clarifying and demonstrating that the fusion reactions are occurring under hot, compressed conditions for the method and apparatus of this present invention application. This *Physical Review E* (2004) by Taleyarkhan et al. article has been previously transmitted under separate cover to USPTO as part of an IDS package dated June 1, 2007.

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The first page and Fig. 7 from the 2004 *Phys.Rev.E* article by Taleyarkhan et al. are excerpted and shown below for the direct viewing by the examiner.

PHYSICAL REVIEW E 69, 036109 (2004)

Additional evidence of nuclear emissions during acoustic cavitation

R. P. Taleyarkhan,[1,*] J. S. Cho,[2] C. D. West, R. T. Lahey, Jr.,[3] R. I. Nigmatulin,[4] and R. C. Block[3]
[1]*Purdue University, West Lafayette, Indiana 47907, USA*
[2]*Oak Ridge Associated Universities, Oak Ridge, Tennessee 37830, USA*
[3]*Rensselaer Polytechnic Institute, Troy, New York 12180, USA*
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(Received 13 May 2003; published 22 March 2004)

Time spectra of neutron and sonoluminescence emissions were measured in cavitation experiments with chilled deuterated acetone. Statistically significant neutron and gamma ray emissions were measured with a calibrated liquid scintillation detector, and sonoluminescence emissions were measured with a photomultiplier tube. The neutron and sonoluminescence emissions were found to be time correlated over the time of significant bubble cluster dynamics. The neutron emission energy was less than 2.5 MeV and the neutron emission rate was up to $\sim 4 \times 10^5$ n/s. Measurements of tritium production were also performed and these data implied a neutron emission rate due to D-D fusion which agreed with what was measured. In contrast, control experiments using normal acetone did not result in statistically significant tritium activity, or neutron or gamma ray emissions.

DOI: 10.1103/PhysRevE.69.036109 PACS number(s): 89.90.+n

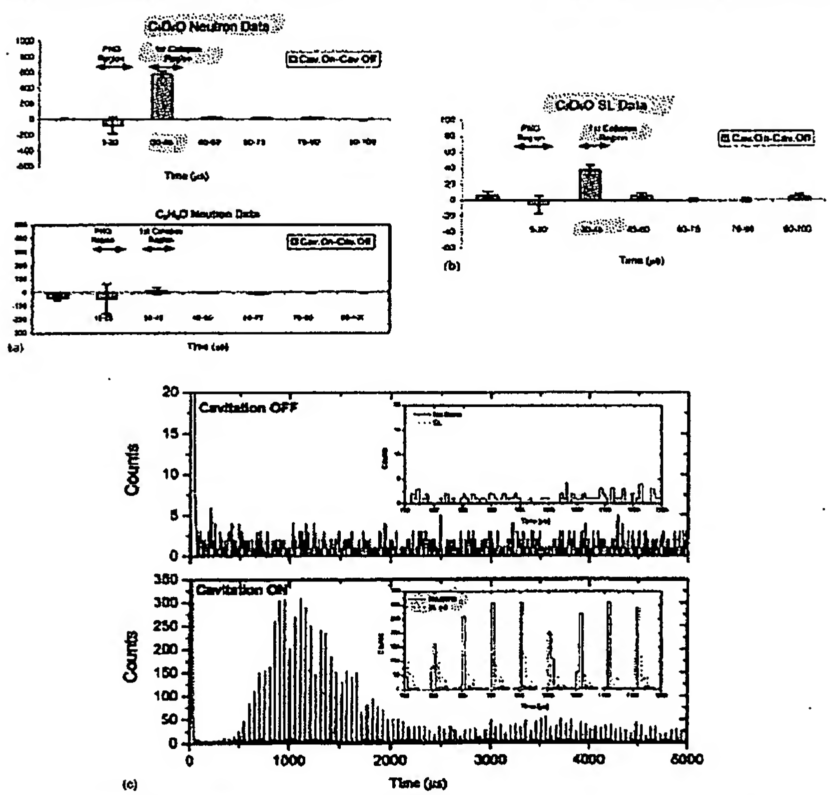

FIG. 7. (a) Change in neutron counts for chilled acetone with cavitation for the first 100 μs (acetone at 0 °C; PNG drive frequency ~200 Hz; acoustic forcing frequency= ~19.3 kHz; error bars are 1 SD). (b) Corresponding change in SL counts for acetone for first 100 μs. (c) Composite plots showing time correlation between neutron and SL counts over 5000 μs for cases of cavitation off and cavitation on (C_3D_6O at ~0 °C; PNG operation at 200 Hz). (d) Time correlation between neutron and SL counts between 0.5 and 2.0 msec. (Cavitation on−cavitation off, C_3D_6O at ~0 °C; PNG operation at ~200 Hz.) (e) Variation of aggregate neutron and SL counts in peak and in-between peak regions between 0.5 and 2.0 msec. (Cavitation on−cavitation off, C_3D_6O at ~0 °C; PNG operation at ~200 Hz. Neutron counts per channel in peak channels are about 50 times larger than for remaining channels; the corresponding SL counts per channel in peak channels are about 5 times larger.)

Also discussed with the examiner on May 24, 2007 was the theoretical foundation that affirmed the claim of supercompression-induced thermonuclear fusion for the experimental conditions of the method used for the current application. This theoretical foundation takes into account all relevant physics and chemistry of the condition. It has passed stringent worldwide technical peer reviews and validated by experts as being on sound theoretical foundations and published in the prestigious journal *Physics of Fluids* (Nigmatulin et al., 2005). This theoretical foundation when applied specifically to the method of the present invention confirms thermonuclear conditions (see Fig. 13 of the paper by Nigmatulin et al., 2005 – *Physics of Fluids*, Vol.17, 107106, 2005) with temperatures and pressures reaching in the range of 10^8 K, and 1000+ Mbar, respectively – convincingly thermonuclear fusion conditions. This Physics of Fluids journal paper has been transmitted to USPTO under separate cover as part of the IDS package.

The front page and Fig. 13 of the *Physics of Fluids*, 2005 journal paper by Nigmatulin et al. are excerpted below for convenience of the Examiner.

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PHYSICS OF FLUIDS 17, 107106 (2005)

Theory of supercompression of vapor bubbles and nanoscale thermonuclear fusion

Robert I. Nigmatulin,[a)] Iskander Sh. Akhatov,[b)] Andrey S. Topolnikov, Raisa Kh. Bolotnova, and Nailya K. Vakhitova
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(Received 10 November 2004; accepted 12 September 2005; published online 25 October 2005)

This paper provides the theoretical basis for energetic vapor bubble implosions induced by a standing acoustic wave. Its primary goal is to describe, explain, and demonstrate the plausibility of the experimental observations by Taleyarkhan *et al.* [Science 295, 1868 (2002); Phys. Rev. E 69, 036109 (2004)] of thermonuclear fusion for imploding cavitation bubbles in chilled deuterated acetone. A detailed description and analysis of these data, including a resolution of the criticisms that have been raised, together with some preliminary HYDRO code simulations, has been given by Nigmatulin *et al.* [Vestnik ANRB (Ufa, Russia) 4, 3 (2002); J. Power Energy 218-A, 345 (2004)] and Lahey *et al.* [Adv. Heat Transfer (to be published)]. In this paper a hydrodynamic shock (i.e., HYDRO) code model of the spherically symmetric motion for a vapor bubble in an acoustically forced liquid is presented. This model describes cavitation bubble cluster growth during the expansion period, followed by a violent implosion during the compression period of the acoustic cycle. There are two stages of the bubble dynamics process. The first, low Mach number stage, comprises almost all the time of the acoustic cycle. During this stage, the radial velocities are much less than the sound speeds in the vapor and liquid, the vapor pressure is very close to uniform, and the liquid is practically incompressible. This process is characterized by the inertia of the liquid, heat conduction, and the evaporation or condensation of the vapor. The second, very short, high Mach number stage is when the radial velocities are the same order, or higher, than the sound speeds in the vapor and liquid. In this stage high temperatures, pressures, and densities of the vapor and liquid take place. The model presented herein has realistic equations of state for the compressible liquid and vapor phases, and accounts for nonequilibrium evaporation/condensation kinetics at the liquid/vapor interface. There are interacting shock waves in both phases, which converge toward and reflect from the center of the bubble, causing dissociation, ionization, and other related plasma physics phenomena during the final stage of bubble collapse. For a vapor bubble in a deuterated organic liquid (e.g., acetone), during the final stage of collapse there is a nanoscale region (diameter ~100 nm) near the center of the bubble in which, for a fraction of a picosecond, the temperatures and densities are extremely high ($\sim 10^8$ K and ~ 10 g/cm^3, respectively) such that thermonuclear fusion may take place. To quantify this, the kinetics of the local deuterium/deuterium (D/D) nuclear fusion reactions was used in the HYDRO code to determine the intensity of the fusion reactions. Numerical HYDRO code simulations of the bubble implosion process have been carried out for the experimental conditions used by Taleyarkhan *et al.* [Science 295, 1868 (2002); Phys. Rev. E 69, 036109 (2004)] at Oak Ridge National Laboratory. The results show good agreement with the experimental data on bubble fusion that was measured in chilled deuterated acetone. [DOI: 10.1063/1.2104556]

107106-19 Theory of supercompression of vapor bubbles Phys. Fluids 17, 107106 (2005)

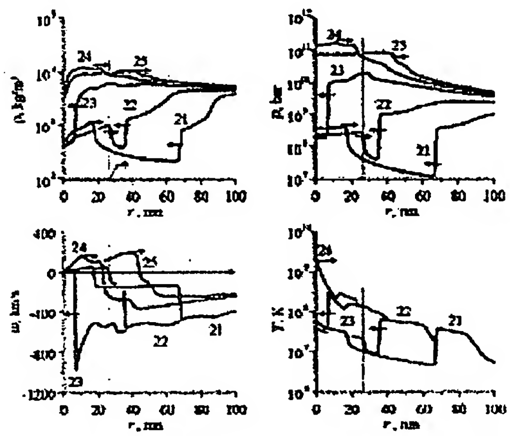

FIG. 13. The final stage of bubble implosion. The vapor parameters distributions near the bubble's center between two interacting shock waves (subpicosecond, high Mach number, stage). The dashed line indicates the radial position of the maximum neutron production point r^*. The numbers denote times: $t_{21}=t^*-0.11$ ps, $t_{22}=t^*-0.06$ ps, $t_{23}=t^*-0.02$ ps, $t_{24}=t^*-0.01$ ps, where $t_{25}=t^*$.

A critical point at the interface takes place at the moment that is close to t_{12} ($t_{12}=t^*-70$ ns, see Fig. 10), when radius of the bubble $a\approx 110$ μm, velocity of the interface, $w_{La}=w_{Ga}\approx -800$ m/s, and pressure in the bubble is no longer uniform, but there is not yet a shock. At this moment condensation stops because the liquid and vapor on the interface becomes a supercritical fluid ($p \gg p_{cr}=46$ bars, $T \gg T_{cr}=508$ K), and there is no longer any difference between vapor and liquid.

It is interesting that around this moment ($t\approx t_{12}$) the pressure distribution in the liquid is smooth (Fig. 10), but the density distribution looks like a jump near the interface where this density increases three times, however, it is not a jump. The sharp increase of the density follows the sharp drop of the liquid temperature in the thermal boundary layer.

During the subcritical phase of the bubble implosion more than half of the evaporated vapor mass ($m_G\approx 260$ ng) condenses. The final mass of vapor ($m_G\approx 100$ ng) after the transition to a supercritical fluid remains constant and the bubble keeps on contracting from $a\approx 110$ μm to the minimum bubble radius $a_{min}\approx 24$ μm (see Fig. 8), as compared to a minimum radius of 0.3–1 μm in typical SBSL experiments (Moss *et al.*[21–23]). Significantly, the mass of the highly compressed gas (vapor) in bubble fusion experiments is 10^5-10^6 times larger than in typical SBSL experiments, thus

Evidence of Operability and Reproducibility

After going with Dr. Palabrica (USPTO examiner) through the video footage of apparatus construction and operation, discussions were on various evidence pieces showing independent validations and replications by other groups with the examiner on May 24, 2007. Following advisement of Examiner, Applicant has respectfully submitted an IDS under separate cover dated June 1, 2007 including three independent replications of published sonofusion results (*Nuclear Engineering and Design* journal paper, Vol. 235, pp.1317-1324 by Xu et al., 2005; Archives of *Trans. American Nuclear Society*, Vol. 95, pp. 736-737, by Forringer et al., 2006; Le Tourneau University, Texas, Press Release, 2006; and the Bugg, W confirmation report dated June 9, 2006 to Purdue University of 2006) of the present invention. Proof of reproducibility and repeatability and confirmation of successful fusion signals attainment following the apparatus and operations of this

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Application from published documents are reproduced below for the works of Xu et al. (2005), Forringer et al. (2006); LeTourneau University Press Release (2006).

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Nuclear Engineering and Design 235 (2005) 1317–1324

Nuclear Engineering and Design

www.elsevier.com/locate/nucengdes

Confirmatory experiments for nuclear emissions during acoustic cavitation

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Received 13 January 2005; received in revised form 14 January 2005; accepted 7 February 2005

Abstract

Confirmatory experiments were conducted to assess the potential for nuclear fusion related emissions of neutrons and tritium during neutron-seeded acoustic cavitation of deuterated acetone. Corresponding control experiments were conducted with normal acetone. Statistically significant (3–11 S.D. increased) emissions of 2.45 MeV neutrons and tritium were measured during cavitation experiments with chilled deuterated acetone. Control experiments with normal acetone and irradiation alone did not result in tritium activity or neutron emissions. Insights from imaging studies of bubble clusters and shock trace signals relating to bubble nuclear fusion are discussed.

Published by Elsevier B.V.

Confirmation of Neutron Production During Self-Nucleated Acoustic Cavitation

Edward R. Forringer, David Robbins, Jonathan Martin

LeTourneau University, 2100 S. Mobberly Ave., Longview, TX 75602. tedforringer@letu.edu

present that could compromise our data. While the statistics from the data presented here are not sufficient to distinguish the neutron spectrum from the test apparatus from a Cf-252 spectrum there is an apparent difference. The Cf-252 spectrum is monotonically decreasing from channels 20 through 60 while the spectrum from the test apparatus appears fairly constant in that region. This region of the spectrum is important because it represents the energy range where the bulk of neutrons are expected from deuterium-deuterium fusion.

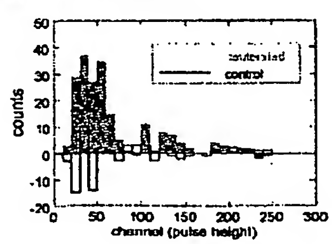

Table 2: Plastic Detector Results			
	Signal	Background	Difference
Deuterated Liquid	81.5	40	41.5±11
Control Liquid	30.5	30	0.5±7.7

SUMMARY

Neutron production during self-nucleated acoustic cavitation of a mixture of deuterated acetone and benzine has been verified with two independent neutron detectors. No neutron production is observed for the deuterated liquid when cavitation is not present, and neutrons are not produced with or without cavitation for the non-deuterated liquid. These observations support previous results indicating deuteron-deuteron fusion during self-nucleated acoustic cavitation of a mixture of deuterated acetone and benzine.

REFERENCES

1. R. P. Taleyarkhan, C. D. West, J. R. T. Lahey, R. I. Nigmatulin, R. C. Block, and Y. Xu, Phys. Rev. Lett.

LeTourneau University News Release

LeTourneau University, P.O. Box 7001, Longview, TX 75607
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Nov. 17, 2006

BUBBLE FUSION CONFIRMED BY LETOURNEAU UNIVERSITY RESEARCH

(LONGVIEW, Texas)— LeTourneau University physics professor Edward R. "Ted" Forringer, Ph.D., and an undergraduate student have just returned from the American Nuclear Society (ANS) winter conference in Albuquerque, N. M. where they presented two papers confirming the existence of fusion in collapsing bubbles.

It has long been observed by scientists that sound waves in a liquid produce flashes of light when bubbles collapse. This phenomenon is called "sonoluminescence." Professor Rusi Taleyarkhan, Ph.D., from Purdue University was the first to successfully show that these collapsing bubbles can produce fusion of two deuterium nuclei. This process is known as acoustic inertial confinement nuclear fusion, commonly called "bubble fusion." Taleyarkhan's results had been called into question, but now have been substantiated by Forringer and his students.

Claims Amendments

The Applicant thanks the Examiner (Dr. Palabrica) for the interview feedback of the May 24, 2007 interview, where the proposed revised set of Claims were discussed to address the non-compliant amendment dated May 1, 2007 as also the May 1, 2008 non-compliance transmittal which requested amendments to the Claims section.

Accordingly, the Claims section has been revised and amended in accordance with the advisement from the Examiner.